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A Guide to the Common Native and Exotic Thistles of South Dakota

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Photo credits:
Jackie Miles – Scotch thistle seedling and rosette; James R. Johnson – Canada thistle habit; wavyleaf flower head and habit; bull thistle habit; Gary E. Larson – Drummond's thistle flower head and habit; wavyleaf thistle rosette; Leon Wrage – musk thistle flower head; Canada thistle flower head; Paul J. Johnson – Front Cover: Drummond's thistle, Back Cover: Scotch thistle habit, Plumeless thistle, seedling, rosette, flower heads, and habit; musk thistle seedling rosette and habit; tall thistle seedling, rosette, flower head, and habit; Canada thistle seedling and rosette; Platte thistle seedling, rosette, flower head, and habit; Drummond's thistle seedling and rosette; Flodman's thistle seedling, rosette, flower head, and habit; wavyleaf seedling; bull thistle seedling in shade, seedling in sun, and rosette; Scotch thistle flower head and habit; Forest and Kim Starr – bull thistle flower head.

Introduction

This guide was compiled to provide an aid for the rapid identification of the more common pest and non-pest thistle species in South Dakota. Because of the great expense of managing and controlling invasive thistles in rangelands, pastures, and croplands, it is essential to be accurate in the identification of any species at hand. The recognition of native species not only helps maintain local biodiversity, but also prevents wasted effort, controls costs, and minimizes herbicide use and chemical pollution. It should be noted that native thistles are important both as floral resources for native pollinating insects and as seed sources for birds. To a certain degree, invasive thistle species are also important in these regards, but their negative impact to native communities outweighs their supplementary value.

There are 11 species of plants in South Dakota commonly called thistle. This does not include sow thistle (*Sonchus* spp.) or Russian thistle (*Salsola* spp.), neither of which is closely related to true thistles. Six of these 11 are native species and are natural components of prairie, meadow, or woodland habitats. The remaining five are exotic species from Europe and Asia that were introduced to the U.S. The exotics are invasive weeds and have significant economic impact on crop and livestock production, native biological community stability, and recreation. This guide is useful for discriminating between the five native and five exotic species most commonly found in South Dakota.

Identification of Thistles

As a group, thistles are set apart by their spiny leaves that vary from toothed to lobed and by their many-flowered discoid heads, which are subtended by an involucre of spirally arranged spine-tipped bracts. Their flowers typically range from lavender-pink to purple, although white to creamy-white flower heads are normal in Platte thistle and rare or occasional in some species.

From seedling to flowering plant, thistles have diagnostic features that are important to recognize. Thistle seedlings (or new sprouts from roots on perennials) develop into a basal rosette of leaves in most species. The photographs below show typical examples of each life stage for each species; however, one must recognize that plant age and environmental factors can cause considerable variations in plant size and leaf form.

As seedlings, thistles are small, and their leaves, which have distinctive spines along the edges and sometimes on veins, are typically broadly oval or narrower. Rosettes have numerous leaves emerging from a central crown, and each leaf is shallowly to deeply cut into lobes or teeth. Bolting plants (those with elongating stems eventually producing flower buds) often retain rosette leaves at their bases, but they also have from one to many leafy stems reaching skyward, with flower buds developing terminally and often on side branches. As plants mature, shoots bolt and then begin the flowering and fruiting stages, with numerous buds, open flower heads, and/or mature heads with parachuted achenes that can be carried away by wind.

Thistle Species

Ten species of thistle are included here. Two are so-called plumeless thistles of the genus *Carduus*. *Carduus nutans* is the more common of these and is best known as **musk thistle**. *Carduus acanthoides* is less frequent and is known simply as **plumeless thistle**. Both of these plumeless thistles are exotic and invasive.

Among the thistles proper (i.e., members of the genus *Cirsium*), five included here are native species: **tall thistle** (*C. altissimum*), **Platte thistle** (*C. canescens*), **Drummond's thistle** (*C. drummondii*), **Flodman's thistle** (*C. flodmanii*), and **wavyleaf thistle** (*C. undulatum*). A sixth native species, yellowspine thistle (*Cirsium ochrocentrum*), is rare in extreme southwestern South Dakota and is excluded because of its rarity and very restricted range within the state. The weedy, exotic species of *Cirsium* are **Canada thistle** (*C. arvense*) and **bull thistle** (*C. vulgare*). **Scotch thistle** (*Onopordum acanthium*) belongs to yet a third genus of thistle, and it, too, is an introduced weed that has rather recently appeared in the Black Hills region.

In this publication, thistles are organized first by genus, then alphabetically by species. To highlight the differences between them, a brief description is given for each genus. Brief descriptions and photographs of each growing stage are given.

Plumeless Thistles, *Carduus* spp.

The common name of this group derives from the nature of the pappus bristles that comprise the parachute on the achenes. Unlike Cirsium species, the pappus bristles in Carduus are either simple or weakly barbed, not feathery-branched (thus the "plumeless" designation). The surface of the receptacle, where the flowers are attached inside the head, is densely bristly. Rosette leaves are deeply lobed, usually with silvery-white margins that give them a frosted appearance.

Plumeless Thistle

Carduus acanthoides L.

Description and Diagnostic Features: Taprooted biennial or winter annual, 1–5 ft. tall, often freely branching above; stems continuously winged with spines, the spiny wings extending up to the heads. Undersides of rosette leaves have spreading hairs on the midrib. Flower heads ¾–1¼" high, erect, the outer involucral bracts less than 1/8" wide at the base, not constricted near the middle. Flowering and fruiting occurs June to August.

Habitats: Abandoned farmsteads, crop field edges, pastures, fencelines, and other disturbed sites on moist soils. Though locally invasive, this species is relatively slow to disperse.

Status: Introduced and invasive

Distribution: Sporadic from the James River Valley and eastward

Musk Thistle

Carduus nutans L.

Description and Diagnostic Features: Taprooted biennial or winter annual, 2–6-plus ft. tall, often much branched above; stems winged with spines extending from the leaf bases, but spiny wings are not continuous and do not extend up to the heads. The leaf undersides are smooth or, sometimes, pubescent, but without spreading hairs on the midrib. Leaves have a prominent white midrib, less deeply lobed than in plumeless thistles. Flower heads 1¼–2½" high and across, usually nodding; outer involucral bracts primarily 1/4–3/8" wide, with a constriction near the middle, their sharp tips spreading outward like the scales of a pine cone. Flowering and fruiting occurs May to August.

Habitats: Musk thistle is usually in highly disturbed areas where moist soil is exposed due to machinery or livestock activity. This species will establish quickly on frequently mowed or heavily grazed sites, bare soil, erosion sites, open spots in damaged turf, etc.

Status: Introduced and invasive

Distribution: Statewide, but more common from the James River valley eastward; locally abundant in the northern Black Hills

Plumeless Thistle

Carduus acanthoides L.


Seedling


Rosette


Flower Heads


Growth Habit

Musk Thistle

Carduus nutans L.


Seedling


Rosette


Flower Head


Growth Habit

Thistles, *Cirsium spp.*

Thistles in *Cirsium* have a pappus of plumose bristles (like a feather, each bristle has fine, short side branches). Bracts of the involucre are united so that only their narrow tips are free, and the involucre is somewhat urn-shaped. The receptacle surface is densely bristly. Rosette leaves are variable, their undersides are often white-woolly, and the margins are not silvery-white.

Tall Thistle

Cirsium altissimum (L.) Spreng.

Description and Diagnostic Features: Taprooted biennial, 3–7 ft. tall, freely branched above; stems not spiny, thinly and unevenly pubescent. Leaves green above, white-woolly beneath, entire- (especially below) to wavy-margined or shallowly lobed and/or toothed, weakly spined or spineless. Rosette leaves entire or nearly so, tapered to winged petioles. Flower heads dark to light purple or uncommonly white; involucre ¾–1¼" high. Flowering and fruiting occurs August to September.

Habitats: This species is locally common on river floodplains, including the lower Missouri River and southern portions of the Big Sioux, Vermillion, and James floodplains. It typically occurs at edges or in clearings of riparian woodlands.

Status: Native, not invasive

Distribution: Southeastern counties

Canada Thistle

Cirsium arvense (L.) Scop.

Description and Diagnostic Features: Perennial, 1–4 ft. tall, spreading laterally by root sprouting to form large, dense patches, the clones functionally male or female (dioecious); stems branching above, smooth or with sparse patches of whitish hairs, green or purple-tinged or white-woolly in the upper portion. Leaves variable in shape, from deeply lobed to nearly entire and, often correspondingly, strongly to weakly spiny, though sometimes spineless (more commonly so in some Black Hills populations); green on both surfaces or (less frequently) sparsely whitish-hairy above and white-woolly beneath. Flower heads smaller than in other thistles and often numerous, with involucres ½–1" tall, ½–1¼" wide; flowers lavender-pink or sometimes white, plumes of fruiting female heads well surpassing the involucre (not so in male heads). Flowering and fruiting occurs June to early September.

Habitats: Canada thistle spreads by seed into disturbed areas. Temporary or seasonal flooding also favors establishment. Once established, the plant quickly spreads by root sprouting, even into adjacent undisturbed areas. Habitats especially prone to infestation include wetlands, floodplains, pastures, crop field edges, gardens, lawns, and roadsides.

Status: Introduced and strongly invasive

Distribution: Statewide

Tall Thistle

Cirsium altissimum (L.) Spreng.

Canada Thistle

Cirsium arvense (L.) Scop.

Platte Thistle

Cirsium canescens Nutt.

Description and Diagnostic Features: Short-lived taprooted perennial, 1½–2½ ft. tall, dying after flowering; stem simple or branched above, white-woolly, winged and usually spiny above by extensions from bases of upper leaves. Leaves slender, deeply lobed, greenish-white above and strongly white-woolly beneath, spiny on lobes and teeth of margins; seedling and early rosette leaves with entire or wavy margins. Flower heads creamy white (rarely pale lavender), earliest ones large (with involucres 1½–1¾" high) and terminal; later ones smaller and lateral. Flowering and fruiting occurs late May to June (July).

Habitats: Sand hill prairies, open and dry areas, dunes, roadcuts, etc.

Status: Native, not invasive

Distribution: Nebraska Sand Hills region and scattered in southern and southwestern South Dakota

Drummond's Thistle

Cirsium drummondii T. & G.

Description and Diagnostic Features: Taprooted biennial, stem very short or up to 3 ft. tall, fleshy and nearly hollow, easily crushed, nearly smooth or with web-like pubescence. Leaves of mature rosettes and stems pinnately lobed and toothed with yellow marginal spines and webby hairs mainly on the veins. Flower heads terminal, solitary or 2–5 in a close cluster, rose-purple, the involucre 1¼–2" high. Flowering and fruiting occurs June to July.

Habitats: Drummond's thistle is confined to the central Black Hills, where it occurs in small and widely dispersed populations in open ponderosa pine forest, edges, and clearings.

Status: Native, not invasive

Distribution: Central area of the Black Hills

Platte Thistle

Cirsium canescens Nutt.

Drummond's Thistle

Cirsium drummondii T. & G.

Flodman's Thistle

Cirsium flodmanii (Rydb.) Arthur

Description and Diagnostic Features: Perennial (sometimes biennial), 1½–3 ft. tall, often forming loose patches by root sprouting; stems usually branching in the upper part, white-woolly. Earliest rosette leaves nearly entire- to wavy-margined; later rosette and stem leaves sometimes nearly entire to usually deeply incised, when the latter then the main lobes of the leaf with spine-tipped divisions and with one division projecting upward from the leaf margin, white-woolly beneath, thinly so to nearly smooth above. Flower heads few to many or (seldom) only one, single on the branches, the involucre ¾–1¼" high, rounded (not indented) at the base where it attaches to the stem. Flowering and fruiting occurs July to August.

Habitats: Flodman's thistle is frequent statewide, especially in moist, open areas in pastures, ditches, meadows, roadsides and disturbed areas. It is especially abundant and widespread in the Black Hills, where it establishes quickly on bare and disturbed sites. This species will quickly occupy recent and severely burned areas and clear-cut woodland in the Black Hills, but will diminish quickly as the site becomes revegetated.

Status: Native, not invasive

Distribution: Statewide

Wavyleaf Thistle

Cirsium undulatum (Nutt.) Spreng.

Description and Diagnostic Features: Taprooted biennial or (usually) short-lived perennial, 1½–3½ ft. tall, occasionally producing more than one stem from the crown, but not spreading laterally from root sprouts to form patches; stems unbranched or sparingly branched above, white-woolly. Earliest rosette leaves nearly entire or irregularly to regularly spiny-toothed; later rosette and stem leaves pinnately lobed and wavy-margined. Flower heads single on the branches, the involucre ¾–1½" high, indented beneath where the head attaches to the stem. Flowering and fruiting occurs July to August.

Though often confused with Flodman's thistle, wavyleaf thistle occupies drier sites and does not form colonies by root sprouting. Stems are stouter, leaves thicker and prominently wavy-margined. The flower heads have a dimple-like impression where they attach to the stem.

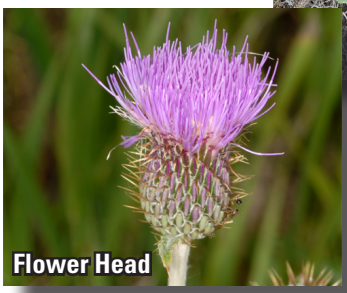
Habitats: Dry, upland prairie, pastures, open, rocky slopes and disturbed sites

Status: Native, not invasive

Distribution: Statewide, but more common in the central and western parts

Flodman's Thistle

Cirsium flodmanii (Rydb.) Arthur



Wavyleaf Thistle

Cirsium undulatum (Nutt.) Spreng.

Bull Thistle
Cirsium vulgare (Savi) Ten.

Description and Diagnostic Features: Biennial, the mature plant openly branched, usually 4–6 ft. tall; stems winged, with spiny downward extensions from the leaf bases, otherwise with scattered tangled hairs when mature, more densely pubescent when young. Leaves with tiny appressed spines (best seen with magnification) on the upper surface, scattered tangled hairs beneath (mainly on the veins), but not white-wooly. Flower heads purple (very rarely white); spine-tipped involucral bracts numerous and spreading, the involucre ¾–1¼" tall, ¾–1¾" across. Rosette leaves green on both surfaces, thinly to rather densely pubescent. Flowering and fruiting occurs July to September.

Habitats: Common in pastures, farmsteads, fence lines, stream banks, windbreaks, lawns, and other moist sites frequently disturbed by machine, livestock, or flooding

Status: Introduced and invasive

Distribution: Statewide, though more common and locally abundant in the Black Hills and east of the James River Valley

Scotch thistle, *Onopordum*

Onopordum is technically distinguished from *Carduus* and *Cirsium* by the receptacle surface, which appears honeycombed by the angular, membrane-bordered pits that contain the flowers; thus the receptacle surface is not bristly. Pappus bristles are minutely barbed and more firm-textured than in the other two genera. Rosette leaves, like the stem leaves, are initially whitened on both upper and lower surfaces by woolly pubescence. Stems are more prominently spiny-winged than in any other thistle found in South Dakota.

Scotch Thistle
Onopordum acanthium L.

Description and Diagnostic Features: Taprooted biennial or rarely annual, 2–8 ft. tall; stem simple to (usually) widely branching above, prominently spiny-winged by decurrent leaf bases, the spiny wings up to 1-inch wide. Leaves whitened above and below by white-woolly pubescence or light green and nearly smooth with age, 2–12-plus inches long, with prominently spined lobes and teeth. Rosette leaves sparsely to densely white-wooly, with triangular spine-tipped lobes. Flower heads single on branches or in loose clusters of 2–5, purple to purplish-white, 1–2" across. Flowering and fruiting occurs June to August.

Habitats: Scotch thistle occurs chiefly along roadways and drainages, in fields, pastures, construction sites, and other disturbed areas. It is potentially the largest thistle in the Black Hills region, rank in habit, and can become locally abundant.

Status: Introduced and moderately invasive.

Distribution: Fairly common in the Black Hills piedmont, surrounding ridges, and nearby prairie, and one small population is known from Dell Rapids, Minnehaha County. This species was introduced within the last 30 years and is spreading.

Bull Thistle

Cirsium vulgare (Savi) Ten.


Seedling in sun


Seedling in shade


Rosette


Flower Head


Growth Habit

Scotch Thistle

Onopordum acanthium L.


Seedling


Rosette


Flower Head


Growth Habit